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Accession number & update
0008662639 20070101.

Title
Platform-based design for an **embedded-fingerprint-authentication** device.

Source
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, {IEEE-Trans-Comput-Aided-Des-Integr-Circuits-Syst-USA}, Dec. 2005, vol. 24, no. 12, p. 1929-36, 16 refs, CODEN: ITCSDI, ISSN: 0278-0070.
Publisher: IEEE, USA.

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Abstract
Fingerprint **authentication,** in an embedded and portable context, requires complex signal, network, and security-protocol processing in a resource-constrained implementation. We present a platform-based design approach for this application, based on a hierarchy of virtual machines (VM). The fingerprint **authentication** is programmed in Java, C, and VHSIC hardware description language, and mapped onto a hierarchy of three machines, consisting of an embedded Java VM, an Sparc-V8 core, and an field programmable gate array. We show how our approach is able to cope with multiple concurrent design processes and multiple application domains, including biometrics signal processing, as well as security-protocol implementation. The platform-based design approach also deals with reuse requirements for embedded software and hardware. The formulation of a platform as a VM enables design exploration and incremental design validation throughout the design traject, and results in a specialized, but still programmable, platform. The Java **bytecode** of our fingerprint **authentication** takes less than 10 kB.

Descriptors
ACCESS-PROTOCOLS; C-LANGUAGE; FIELD-PROGRAMMABLE-GATE-ARRAYS; FINGERPRINT-IDENTIFICATION; HARDWARE-DESCRIPTION-LANGUAGES; JAVA; VIRTUAL-MACHINES.

Classification codes

C6130S Data-security*;
C5640 Protocols;
C5260B Computer-vision-and-image-processing-techniques;
C5215 Hardware-software-codesign;
C6110J Object-oriented-programming;
C7430 Computer-engineering.

Keywords
platform-based-design; **embedded-fingerprint-authentication-device;** security-protocol-processing; resource-constrained-implementation; C-program; VHSIC; hardware-description-language; Java-virtual-machine; Sparc-V8-core; field-programmable-gate-array; multiple-concurrent-design-processes; multiple-application-domains; biometrics-signal-processing; reuse-requirements; embedded-software; embedded-hardware; design-exploration; incremental-design-validation; hardware-software-codesign; system-on-chip.

Treatment codes
P Practical.

Language
English.

Publication type
Journal-paper.

Availability
SICI: 0278-0070(200512)24:12L.1929:PBDE; 1-Y.
CCCC: 0278-0070/$20.00.

Digital object identifier
10.1109/TCAD.2005.853709.
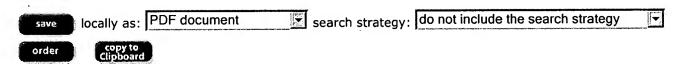
Publication year
2005.

Publication date
20051200.

Edition
2005048.

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